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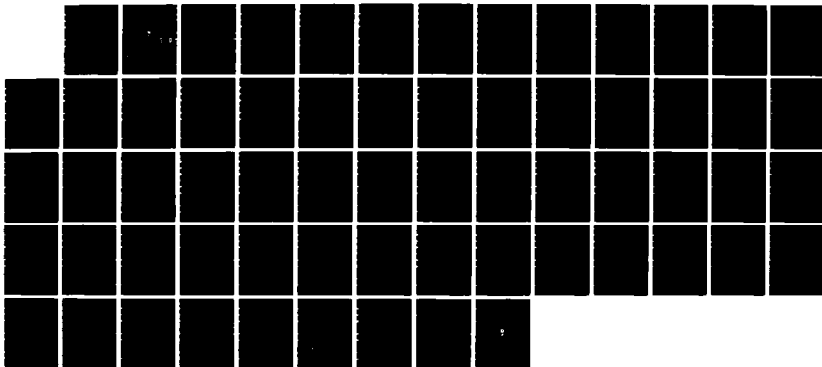
THE RELATIONSHIP BETWEEN REENLISTMENT INTENTIONS AND
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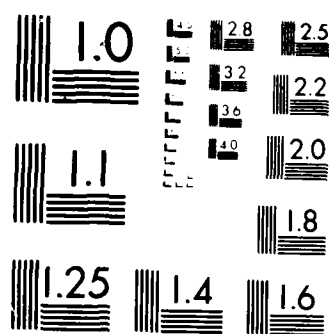
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THESIS

THE RELATIONSHIP BETWEEN REENLISTMENT
INTENTIONS AND RESERVE PARTICIPATION
WITHIN THE ARMED FORCES

by

Tor-Egil Haakestad

December 1986

Thesis Advisor:

G. W. Thomas

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<p>This thesis investigates the military affiliation intentions of enlisted personnel in all four branches of service in their first or second term with less than a year remaining of their present active duty obligation. The investigation is done in two sequences:</p> <ol style="list-style-type: none"> (1) reenlist/does not reenlist ("stayers" vs "leavers"), and for those who plan to leave, (2) join the reserves/do not join the reserves ("reservists" vs "civilians"); <p>using the demographic, tenure, cognitive/affective, economic, and employment alternative variables as explaining factors. The analysis is</p>					
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- > done by using the Probit probability model which calculates the probabilities of each individual to reenlist/join the reserves, given specific characteristics. The results show that the explanatory effect using the groups of variables mentioned above, is higher for the reenlistment decisions than for the reserves decisions.

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The relationship Between Reenlistment
Intentions and Reserve Participation
Within the Armed Forces

by

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ABSTRACT

This thesis investigates the military affiliation intentions of enlisted personnel in all four branches of service in their first or second term with less than a year remaining of their present active duty obligation. The investigation is done in two sequences

- 1) reenlist does not reenlist ("stayers" vs "leavers"), and for those who plan to leave
 - 2) join the reserves do not join the reserves ("reservists" vs "civilians"),
- using the demographic, tenure, cognitive affective, economic, and employment alternative variables as explaining factors. The analysis is done by using the Probit probability model which calculates the probabilities of each individual to reenlist join the reserves, given specific characteristics. The results show that the explanatory effect using the groups of variables mentioned above, is higher for the reenlistment decisions than for the reserves decisions.

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I. INTRODUCTION

A. GENERAL

As the U.S. Armed Forces shifted from a draft system to an All Volunteer Force in 1973, the efforts to keep necessary quantity and quality of people affiliated with the military become crucial in obtaining the U.S national security objectives. Because of the fact that the new system is an entirely volunteer system, military policy makers and commanders in each of the services have to watch closely what impact the policies and the day to day management have on the enlistees' affiliation wishes.

The effectiveness of the Armed Forces is depending upon the experience level and skills of - among others - the enlisted personnel. The nature of the duties in the Armed Forces are such that the high performance needed to obtain national security objectives can be reached only if at least a great number of the enlisted have been in the services for a substantial amount of time. Therefore the turnover within the military services has to be closely watched.

This thesis investigates the affiliation intentions of active duty enlisted personnel in all four services, serving in their first or second term of enlistment, and have less than one year left of their present obligations.

B. DATA BASE

With manpower issues assuming an ever greater importance in Defence planning and budgeting, Rand Corporation conducted under Task Orders 79-V-1 and 80-V-1 a study, sponsored by the Office of Assistant Secretary of Defence (Manpower, Reserve Affairs & Logistics), seeking to develop broad strategies and specific solutions for dealing with present and future manpower problems. In connection with this study a major data collection effort was made - the "1978 DoD Survey of Officers and Enlisted Personnel" - **which** focused on the in-service population, i.e. the men and women on active duty **in all** the four services. Since this study investigates the career decisions of enlistees **close to** their end of present enlistment contract, only the first part of this survey - Form 1 - which emphasized on reenlistment career intentions was used.

This survey is the last major survey of that kind administered and - even if this is of some age - the information gathered are believed to still be valid, and will be used in this analysis.

C. RESEARCH QUESTIONS

The research questions of this analysis will emphasize on the investigation of which of the demographic, tenure, cognitive affective, economic, and employment alternative factors that have implications on an enlistee's reenlistment intention and intention for joining the reserves. Further, the magnitude of each of the explanatory variables upon those decisions will also be examined. The reenlistment intentions and the intentions of joining the reserves are dichotomized - that is the intentions are organized on a yes no fashion. Chapter IV analyses the reenlistment decisions - "stayers" vs "leavers"- while Chapter V analyses the reserve intentions - "reservists" vs civilians .

D. METHODOLOGY

Since the model developed and analyzed are binary-choice models, the methodology to use had to be able to calculate the likelihood (probability) of reenlistment (or joining the reserves) of an individual with given characteristics. The probability has to lie between 0 and 1; a weighted least square method cannot be used since there is no guarantee that the predicted value of the dependent variable will lie in the 0-1 interval. A non-linear probability model - Probit - solves that problem and will be applied. The Probit model is associated with the cumulative normal probability function.

E. LITERATURE REVIEW

To develop a conceptual frame work in which the turnover of enlisted personnel can be viewed, the factors that former researchers have found important in explaining the turnover phenomenon was explored. Those variables factors found in that literature search was used as the basis of the choicee and grouping of the candidate variables further analyzed to develop the final reenlistment and reserve models.

F. ORGANIZATION OF THE STUDY

This **study** will in Chapter II give the literature review in detail and the data review, **including** the definitions and views of turnover, the variables affecting turnover found by **other** researchers, and the useful grouping of the explanatory variables. At the end of the chapter there is a description of the data base from which the data used are originated from.

In the next chapter the dependent variable for each of the two models investigated are discussed. So are also the independent explanatory variables finally argued for to be included in the groups of candidate variables. The chapter conclude with the description of the regression model used - Probit - and why the Ordinary Least Square method are of no use.

Chapters IV and V describe the analysis of the reenlistment decisions and the reserve decisions, respectively, including the model estimation and the results from these analysis. An analysis of the models' prediction power follows at the end of each of those chapters.

The final chapter - Chapter VI - summarize the conclusions commenting the the different explanatory variables that affected both the reenlistment and reserve model, and those who affected only one of the models. Some recommendations are given and the chapter concludes with the suggestions for further areas of investigations research.

II. LITERATURE REVIEW/DATA REVIEW

A. GENERAL

The purpose of this literature review is to develop a conceptual framework in which the turnover of military enlisted personnel can be viewed, and to describe the factors that former researchers have found important in the explanation of the turnover phenomena.

Employee turnover has numerous potential negative consequences for an organization such as:

- * increased costs,
- * demoralization,
- * negative public relations,
- * operational disruptions,
- * strategic opportunity costs,
- * decreased employee social integration,
- * potential security problems.

In contrast positive consequences of turnover includes:

- * removal of undesirable employees,
- * voluntary termination rather than involuntary termination,
- * fresh thoughts and experience enter the organization,
- * advancement and promotion opportunities,
- * loss of dissatisfied workers can improve working environment.

Turnover has been the object for academic research for more than 70 years. As indicated by Muchinsky & Morrow [Ref. 1] there have been more than 2000 publications on the topic. Turnover has been researched from psychological, as well as sociological and economic perspectives. Psychologists have predominately studied the relationship between turnover and job satisfaction, personality, intelligence, aptitude, and biographical data. The impact of structural determinants on turnover has been investigated primarily by sociologists and organizational theorists. Economists have studied the relationship between turnover and such factors as the business cycle and industrial quit rates.

In the following sections, alternative definitions of turnover will be discussed. To create a platform for analyzing turnover, previous studies in the field will be looked into and the factors most strongly related to turnover described. Some of these studies are of the civilian sector while others have been military service specific. At the conclusion of the chapter an extraction of the factors found in previous studies which will be used in this study to the extent that they are available in the data base, will be given. This chapter will conclude with a description of the data base to be used.

B. DEFINITIONS AND VIEWS OF TURNOVER

According to Abelson and Baysinger [Ref. 2] turnover can be viewed as functional or dysfunctional for the organization. Dysfunctional turnover is voluntary separation of employees whom the organization prefers to retain (Dalton et al., 1982).¹ The presumption that all organizational turnover is dysfunctional has been fairly well dismissed in a number of papers (Dalton & Todor, 1979; Dalton, Krackhardt, & Porter, 1981; Dalton, Tudor, & Krackhardt, 1982; Muchinsky & Morrow, 1980; Staw, 1980; Staw & Oldham, 1978).²

Abelson & Baysinger [Ref. 2] indicate that trying to determine the extent of an organization's turnover problem from its absolute turnover rate is inappropriate for a number of reasons. First, some of the total turnover is due to involuntary turnover, like death, illness, or retirement. Generally, those separations are inappropriate for the study of turnover. Second, some employee separations involve employees the organization would prefer not to retain and is merely a convenient substitute for termination.

Dalton et al. [Ref. 3] divide voluntary turnover into controllable and uncontrollable turnover. Since their study of turnover is conducted for the purpose of finding areas for managerial discretion to control turnover, it is important to know what kind of turnover the organization can do something about. Voluntary turnover caused by job dissatisfaction can be corrected, but people leave an organization for other reasons as well, like further education, health matters, and family commitment.

The separation of those employees that the organization wants to keep is costly, but it may be that the full organizational cost of retaining those employees may exceed the values of the costs savings associated with preventing their separation. As Dalton

¹Cited in Abelson & Baysinger, Ref 2.

²Cited in Abelson & Baysinger, Ref 2.

& Todor have noted "It may be far less expensive to cope with turnover than to prevent it" (1979, p. 226).³ The optimal turnover rate is the rate that minimize the sum of the costs of turnover and the costs of reducing it. Mowday [Ref. 4] states that researchers have often neglected the positive outcomes associated with employee turnover, as suggested by several authors (Dalton and Tudor, 1982; Mobley, 1982; Mowday, Porter, and Steers, 1982; Staw, 1980).⁴

C. VARIABLES AFFECTING TURNOVER

As reviewed in Muchinsky & Morrow [Ref. 1], Porter and Steers (1973)⁵ examined the relationship between met expectations and turnover. They found that when an employee's prior expectations are met on the job, the person is less likely to quit.

Further, Price (1975)⁶ provides an inventory of four turnover determinants which have received empirical support. Those are pay, participation in primary groups, communication, and centralization.

Muchinsky & Morrow [Ref. 1] suggest that turnover has three major sets of determinants: individual, work-related, and economic opportunity. Empirical evidence shows that the following variables are related to turnover.

- * Individual factors

- Age, length of service, family size, vocational interest, intelligence, biographical indicies, aptitude, personality;

- * Work-related factors

- Recognition and feedback, supervisory characteristics, experienced job satisfaction, role clarity, pay, promotion;

- * Economic opportunity factors

- Employment level, average level of earnings, number of job vacancies.

As stressed by Muchinsky & Morrow [Ref. 1], turnover is not the end product itself, but rather in turn has consequences for the individual, the organization, and society. Further they state that surprising little attention has been devoted to the consequences of turnover.

³Cited in Dalton et al., Ref 3.

⁴Cited in Mowday, Ref 4.

⁵Cited in Muchinsky & Morrow, Ref 1.

⁶Cited in Muchinsky & Morrow, Ref 1.

Mobley et al. [Ref. 5] states that previous research reveals that age, tenure, overall satisfaction, job content, intentions to remain on the job, and commitment are consistently and negatively related to turnover, but those factors explain only about 20% of the variance in turnover.

According to Viscusi [Ref. 6] who analyzed the sex differences in worker quitting within civilian companies, found that sex had significant impact on quits. Likewise Blau and Kahn [Ref. 7] found that sex differences had impact on the quits in their study of young workers.

A research summary by Mobley et al. [Ref. 5] shows the following results:

1. Individual Demographic and Personal Factors

- * Age - a negative relationship to turnover was indicated though age alone contributes little to the understanding of turnover behavior.
- * Tenure - length of service is one of the best single predictors of turnover.
- * Sex - no significant impact has been shown in some studies, while other found that females have higher quit probabilities.
- * Family responsibilities - marital status is associated with decreased turnover.
- * Education - some studies show that higher education leads to lower tenure, while other studies discovered no difference.

2. Job Satisfaction

- * There is a negative relationship between overall satisfaction and turnover.

3. Organizational and Work Environment Factors

- * Pay and promotion - some studies show negative correlation between pay satisfaction and turnover, while other studies claim a lack of relationship between pay satisfaction and turnover.
- * Supervision - Some studies found a significant relationship between leadership and turnover.
- * Peer group relations - no significant results were reported.
- * Status - Some studies found a negative relationship between perceived status and turnover.

4. Job Content Factors

- * Job content factors have been found to be significantly related to turnover

5. External Environment

- * The availability of other jobs has great influence on turnover

6. Occupational Groupings

- * A study found moderate support for the hypothesis that unskilled blue collar workers have higher turnover than white-collar workers, that non-managers have higher turnover than managers, that non-government employees have higher turnover than government employees, and that higher professionalism is associated with higher turnover.

Muchinsky [Ref. 8] discusses the relationship between turnover and previous unemployment. Previous studies show that people with substantial periods of prior unemployment are more likely to quit than those without this experience. When he examined the relationship between organizational rewards and the retention of "previous unemployed employees" five factors emerged as important: type of pay system, promotional opportunities, job type, type and degree of counseling, and type of training.

Hopkins [Ref. 9] has studied the importance of work and job satisfaction within the public sector. She found that employees who are more satisfied with their jobs tend to have jobs characterized by scope and depth, adequate resources, favorable perceptions of their supervisor, fairness of promotion, adequate working conditions, job mobility, lack of discrimination, are not union members, and the job environment consists of satisfied co-workers.

Another way of looking at turnover is exemplified by Krackhardt and Porter [Ref. 10], who asked "What effect does turnover in an organization have on the attitudes of those who remain in the organization?" One of their findings was that the closer the **employee** was to those who left, the more committed he or she became to the job. The **hypothesized** reasoning is that increased promotion opportunities, increasing job satisfaction justify their own decision to stay. In addition benefits could arise for those who stayed if those who left did not carried their share of the work load. But this is a very little researched area of turnover, so no definite conclusions can be drawn.

Caldwell and O'Reilly III [Ref. 11] state that "common sense and empirical research suggest that when individuals use accurate information as a basis for decision making, they make better decisions". They claim that accuracy of information have important effects upon job choices. Thus, if individuals make job choices with artificially high expectations of what they will experience on the job, lower satisfaction and higher turnover are more likely than with realistic expectations. They report 11 recent studies (Reilly, Brown, Blood, and Malatesta, 1981)⁷ that show that turnover was significantly lower than expected across studies for individuals who had received realistic job preview information.

The studies referred to up to this point have dealt with turnover in general and have not investigated findings within a military environment. Motowidlo and Lawton [Ref. 12] conducted a study using a sample of 930 Army soldiers who were within 6 months of the expiration of their first tour of service and who had not yet committed themselves to a reenlistment decision. They used the variables perception, satisfaction, expectancy (reenlist), expectancy (leave), and intention to explain subsequent reenlistment decisions. Their model was based on theories by Zajonc (1980), Zajonc & Markus (1982), Mobley, Griffith, Hand & Meglino (1979), Price (1977) Michaels & Spector (1982), Arnold & Feldman (1982), Mobley et al. (1979).⁸ The findings showed that there was positive relationship between reenlistment and intention, perception, satisfaction, and expectancies. The explanatory effect was greatest with intention (R-square = .44) compared to all the other variables together (R-square = .126).

Brinkerhoff & Grissmer mention in their discussion of the Gates Commission [Ref. 13] that pay, draft motivation, the extent of moonlighting, taste for military life, educational tuition grants, unemployment, enlistment bonus and continuation bonus, and training are important variables in examining accession, attrition, and retention within the Reserve Forces in an all-volunteer environment. They found that:

- * pay elasticity is lower within the Reserves than in the civilian labor market;
- * since people work fewer hours within the Reserves than during a "normal" civilian moonlighting job, this may imply that taste plays a larger role in reserve decisions than in civilian moonlighting decisions; and
- * the effect of declining unemployment is more difficult to predict for the Reserves than for the regular forces.

⁷Cited in Caldwell & O'Reilly III, Ref 11.

⁸Cited in Motowidlo & Lawton, Ref 12.

Jacobson & Thomason [Ref. 14] found that permanent change of station (PCS) had **great** influence on wives earnings, and thereby the total family income. This means that PCS is not desirable and often negatively influences the likelihood of a positive reenlistment decision. They found that for wives with high working intensity, the loss of income during an enlistment period is one and a half times the amount of the reenlistment bonus offered.

Mangum and Ball [Ref. 15] investigated the skill transfer between military service and civilian employment. Using the National Longitudinal Surveys (NLS) of Labor Force Experience they found that very few individuals reported that they actually used skills acquired in the military in civilian employment, although there were reported in 1976 that 80 % of the military occupational specialties have direct counterparts in the civilian labor market. Although they analyzed the relationship between occupational personal characteristics and skill transfer, this study implies some relationship between skill transfer and the possibility of quitting the military to join the civilian labor force.

Hosek et al. [Ref. 16] relates retention to military civilian compensation, national employment conditions, and the coverage and level reenlistment bonuses. The conclusions showed that the higher the ratio military civilian compensation, the higher the level of national unemployment, and the better the reenlistment bonuses were the higher were the retention rates. These findings were based on the great increase in the retention rate from FY 1971-1972 (13%) to FY 1977-1978 (25.6%).

D. VARIABLE SELECTION

Based on the overview of the individual factors used in the preceding retention studies, the following is a summary of the variables that seemed most likely to apply in this study.

1. Demographic

- * Age, sex, race, family responsibilities, education, vocational interest, intelligence, aptitude, personality

2. Tenure

- * Length of service, promotion

3. Cognitive/affective orientation

- * Taste for military life, permanent change of station (PCS), job satisfaction, supervision, status, expectations, intentions, participation in primary groups, communication, centralization

4. Income and economic incentives

- * pay, extent of moonlighting, educational tuition grants, bonuses, military/civilian pay ratio

5. Perception of employment alternatives

- * Employment level, number of job vacancies, skill transfer, military/civilian pay ratio

The variables selected for analysis in this thesis will be more extensively described in the next chapter.

E. DATA REVIEW

The data used for this study are from the "1978 DoD Survey of Officers and Enlisted Personnel". The survey was conducted as a part of Rand Corporation's Manpower, Mobilization, and Readiness Program, sponsored by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs & Logistics). The purpose of the survey was to provide the Office of the Secretary of Defense and the military services with data for policy formulation and research. It was one of three surveys conducted by Rand to examine manpower issues such as enlistment decisions, career orientation, and attitudes of military members to policies that affect them and their families.

The survey was fielded in late January 1979 to a world-wide sample of approximately 93,000 men and women in all four services. The data collection was completed in June 1979, and 57,540 people had returned the questionnaires. When the sample stratification was designed, supplementary samples were constructed for females and blacks to ensure statistically significant samples of blacks and females for special analysis. Hence, for this sample as a whole, females and blacks are overrepresented.

The survey consisted of four questionnaires: two for enlisted personnel and two for officers. Form 1 for enlisted and Form 3 for officers emphasized economic and labor force factors and was oriented towards military family income, labor force participation, reenlistment decision making and military compensation. Form 2 for enlisted and Form 4 for officers dealt with various aspect of military life, and the impact of specific personnel policies such as alternative recruitment systems.

Since this study examines the career decisions of enlisted personnel close to the end of their present contract, Form 1 - 1978 DoD Survey of Enlisted Personnel - which emphasized reenlistment decisions, is used. Form 1 has the following ten subject areas:

- * Military background
- * Reenlistment career intentions

- * Military work experience
- * Individual characteristics
- * Current housing arrangements
- * Military compensation and benefits
- * Military retirement systems
- * Civilian labor force experience
- * Family resources
- * Civilian job research

In addition to presenting the methodology to be used in this study, the next chapter will also discuss the factors used in the turnover model and the specific survey variables used as measures of those factors.

III. METHODOLOGY

A. THE DEPENDENT VARIABLE

The decision the enlisted soldier faces at the end of his/her contract period is whether to

- * sign a new contract (reenlist) or
- * quit and join the reserves or
- * quit and not join the reserves.

By understanding the factors which influence each of these decision options policy makers and commanders can gain insight into how to keep a good individual affiliated with the Armed Forces - whether in active duty or in the reserves - and thus obtain necessary strengths (both quantitative as well as qualitative) within each of the armed forces.

The likelihood of reenlistment at the end of the current term of service was one of the areas addressed in the 1978 officers and enlisted survey. Specifically, in Form 1 (Question 20) the respondent was asked:

How likely are you to reenlist at the end of your current term of service? Assume that no Reenlistment Bonus Payments will be given, but that all other special pays which you currently receive are still available. Mark one.

Eleven responses were possible, ranging from "no chance" to "certain":

- * "no chance" (0 in 10)
- * "very slight possibility" (1 in 10)
- * "slight possibility" (2 in 10)
- * "some possibility" (3 in 10)
- * "fair possibility" (4 in 10)
- * "fairly good possibility" (5 in 10)
- * "good possibility" (6 in 10)
- * "probable" (7 in 10)
- * "very probable" (8 in 10)
- * "almost sure" (9 in 10)
- * "certain" (10 in 10)

In addition, "don't know" and "does not apply, I plan to retire" were two possible responses.

Additionally, the respondent was asked (Question 17): "When you finally leave the military, do you plan to join a National Guard or Reserve unit?" The possible responses were as follows:

- * "definitely yes"
- * "probable yes"
- * "probable no"
- * "definitely no"
- * "don't know not sure"

A frequency analysis of these questions is presented in Appendix A.

Four groups of individuals will be analyzed in this turnover study, "stayers", "leavers", "reservists", and "civilians". "*Stayers*" were defined as those who responded "good possibility", "probable", "very probable", "almost sure", and "certain" on Q20. "*Leavers*" were defined as those who responded "no chance", "very slight possibility", and "slight possibility" on Q20. Those who answered "some possibility", "fair possibility", "fairly good possibility", and "don't know" on Q20 were deleted from the study. This cut off is based on the empirical data showing that those in the middle groupings who were deleted from the study, contained relatively few cases. "*Stayers*", "*leavers*", and those deleted from the study represent 40.5%, 47.5%, and 12%, respectively.

"*Reservists*" are defined as those who responded "definitely yes" or "probably yes" on Q17. "*Civilians*" are defined as those who responded "probably no" or "definitely no" on Q17. Those who answered "don't know" were deleted from the study.

The subsequent analysis uses a sequence of two group comparisons: First, "stayers" vs "leavers", and second, - given a "leaver" - "reservists" vs "civilians".

The survey was given to all enlisted, whether they had just started on a term of service or **were** about to end one. For soldiers just starting their career, responses to questions **about** their reenlistment plans or plans for joining the reserves are not necessarily **representative** of their responses close to the end of their term of service. To avoid this problem of nonrepresentativeness only those respondents with less than 12 months left of their present commitment will be analyzed. A cut off of 9 months left of current enlistment was considered. However, the result of a special regression run on the "number of months left of duty"'s impact on the reenlistment decision

showed that the likelihood of reenlistment varied for all the four groups: "less than 3 months", "3 months-less than 6 months", "6 months-less than 9 months", and "9 months-less than 12 months". Although the explanatory effect was small ($R^2 = .01$) and those in the 9-12 months group only represent 7.4% of the total number of respondents having less than a year left of current enlistment, it seems natural to use a cut off at 12 months left of current enlistment.

Another restriction of the sample applied to the enlistment period in which a respondent was serving - question Q9. People who have made a positive reenlistment decision several times (serving in their 3rd or higher enlistment period) are going to have little variation in their subsequent reenlistment intentions. A separate analysis showed that there were no differences in the likelihood of reenlisting between people serving in their third or higher term. One of the main reasons for this study is to find out what policy factors are related to the reenlistment intentions of soldiers. Respondents serving their 3rd or higher enlistment period will be excluded from further analysis. After this point the enlisted soldier is likely to spend his career in the uniformed services.

B. EXPLANATORY VARIABLES (FACTORS)

As stated in the literature review earlier studies indicate that turnover decisions are likely to be explained by demographic, tenure, cognitive affective orientation, income and economic incentives, and perception of employment alternatives factors. With that experience as a guideline the following factors and associated variables will be investigated to find out whether such variables are useful for explaining employment decisions.

The following candidate variables will be used in explaining the reenlistment join the Reserves decisions. (The exact variable question is cited in Appendix B)

1. Demographic Variables

Table 1 gives the list of candidate demographic variables and their value codings. ~~These~~ include gender, age at entry, race, marital status, number of dependents, ~~and~~ educational improvement.

For Race, the grouping "non-black" consists of "american indians", "hispanic", "oriental", "white", and "other". A cross tabulation of race and likelihood of reenlistment showed that the latter group show almost similar "behavior"

TABLE 1
DEMOGRAPHIC VARIABLES

<i>Variable</i>	<i>Question</i>	<i>Value coding</i>
Gender	Q40	0 = female 1 = male
Age at entry	Q42	continuous
Race	Q44	0 = non-black 1 = black
Marital status	Q46	0 = not married 1 = married
Num of dependents	Q57	continuous
Educ improvement	constructed	continuous

in that question in contrast to "black". For the first enlistment period served "oriental" showed a "behavior" closer to "black", but was not close to "black" "behavior" in the second enlistment period. Altogether, they were judged as belonging to the "non-black" group.

For current marital status, "Not married" is defined as "single", "divorced", or "widowed" while "married" is defined as "married", or "separated", since the latter category is expected to behave more similarly to married than single respondents.

Educational improvement is computed as the difference between Q52 (years of education today) and Q51 (education at entry). This is a continuous variable.

Highschool education or GED certificate, Q53 was considered a candidate variable but turned out that almost all respondents (more than 96%) had a highschool diploma or **GED** certificate. Therefore this variable was not included.

2. Tenure Variables

The survey used in this study contains only two tenure variables, Q8 - years of service (YOS), and Q9 - number of enlistment periods served. The number of enlistment periods is used in this decision and is explained above.

The YOS variable was investigated to determine whether length of service had any impact on the reenlistment decision. A cross tabulation between YOS and reenlistment plans ("stayers" and "leavers") showed almost the same relationship between reenlistment plans and YOS within each YOS up to 6 years. For the YOS 7 years up to 10 years the likelihood of reenlistment increased substantially compared to those within smaller YOS (from below 20% to above 30%). Although the groups 1 to 6 and 7 to 10 years of service showed similarities as groups, there still were some variations within each group.

Since only those within their first or second enlistment period are investigated, there are very few cases which have more than 10 years of service. Accordingly, YOS up to 10 years will be used as a tenure variable.

3. Cognitive/Affective Variables

Table 2 gives the list of candidate cognitive/affective variables and their value codings. These includes feelings about present location, about current housing, expectation of military life, military vs civilian job and the family, satisfaction of military life, and branch of service.

Chances for undesirable location on next tour, Q19, was expected to contribute to the explanation of the reenlistment decisions, but was dropped due to the great number of missing values (34.4%).

Branch of service effects are captured through the use of dummy variables with Air Force as the reference variable.

4. Economic Incentives Variables

The candidate economic incentive variables and their value coding are given in Table 3 and include measures of total income, spouse working habits, measurements of outstanding debts and value of assets, and comparison of the financial situation of today with 3 years ago.

Total income of the enlisted soldier was constructed from the sum of Q69 (basic salary), Q70 (basic allowance for quarter), Q71 (basic allowance for subsistence), and Q73 (special allowances). Missing values of the variables Q70, Q71, and Q73 were treated as zero income.

Number of weeks spouse worked for pay was dichotomized. Those worked 25 weeks or less were considered "not working", while those who worked 26 weeks or

TABLE 2
COGNITIVE AFFECTIVE VARIABLES

<i>Variable</i>	<i>Question</i>	<i>Value coding</i>
Feelings about present location	Q7	continuous 1 = very dissatisfied 7 = very satisfied
Feelings about current housing	Q59	continuous 1 = very dissatisfied 7 = very satisfied
Military life as expected	Q104A	continuous 1 = strongly agree 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
My fam better off with me in civ job	Q104D	continuous 1 = strongly agree 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Satisfied with military life	Q105	continuous 1 = very dissatisfied 7 = very satisfied
Service	Army	0 = not in the Army 1 = in the Army
Service	Navy	0 = not in the Navy 1 = in the Navy
Service	MC	0 = not in the MC 1 = in the MC
Service	AF	reference variable

more were defined as "working". The reason for creating a dichotomous variable is that spouses working more than half time have a greater attachment to the local labor market than those working less than half time. Therefore, it is expected that a reenlistment with permanent change of station will have a different impact on families where non-military spouse is working half time or more than on those where the spouse is working less than full time.

TABLE 3
INCOME AND ECONOMIC INCENTIVE VARIABLES

<i>Variable</i>	<i>Question</i>	<i>Value coding</i>
Total income	constructed	continuous
Spouse work	Q89	0 = do not work 1 = work
Outstanding debts	Q94	continuous
Value of assets	Q95	continuous
Compoffin situat	Q96	1 = lot better 2 = somewhat better 3 = about the same 4 = somewhat worse 5 = lot worse

5. Employment Alternative Variables

The candidate variables for employment alternatives and their value coding are given in Table 4 and include measures of civilian job offers, likelihood of finding a civilian job, the use of military skills in a civilian job, civilian vs military job relations, civilian vs military compensation, and military pay and inflation.

The effect of impressions of job characteristics of alternative civilian jobs was measured by using question Q102 which consists of thirteen variables all dealing with civilian vs military job comparisons.

Those answering "no idea" (variable value 6) on Q103 - Civilian vs military compensation - were grouped with "about the same" (variable value 3).

C. REGRESSION

In the analysis, the four constructed variables "stayers", "leavers", "reservists", and "civilians" are used in a sequence of two dichotomous choices: "stayers" vs "leavers" and for "leavers": "reservists" vs "civilians".

Thus, the models are binary-choice models. These models assume that the individual (in this study the enlisted soldier) are faced with two alternatives and that the decision made is dependent upon the characteristics of the individual [Ref. 17]. The

TABLE 4
EMPLOYMENT ALTERNATIVE VARIABLES

<i>Variable</i>	<i>Question</i>	<i>Value coding</i>
Civ job offers	Q97	0 = no 1 = yes
Find civ job	Q98	continuous 1 = no chance 10 = certain
Mil skill in civ	Q100	continuous 1 = no chance 10 = certain
Civ vs mil jobs	Q102	1 = civ a lot better 2 = civ slightly better 3 = about the same 4 = civ slightly worse 5 = civ a lot worse
Civ vs mil comp	Q103	1 = a lot more in mil 2 = little more in mil 3 = about the same 4 = little more in civ 5 = a lot more in civ
Mil pay not keep up with inflation	Q104C	1 = strongly agree 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree

dependent variable may be interpreted as the likelihood an individual soldier will reenlist given his her specific individual characteristics. The likelihood (probability) has to be between 0 and 1. A weighted least square method cannot be used since there is no guarantee that the predicted value of the dependent variable will lie in the 0-1 interval. A model that solves that problem is the probit probability model.

The most serious set of difficulties arises from the fact that predictions may lie outside the (0,1) interval. A transformation of the original model in such a way that predictions will lie in the (0,1) interval for all X is necessary. The use of the cumulative probability function will provide a suitable transformation. The resulting probability distribution might be represented as

$$P = F(a + bX) = F(Z) \quad (\text{eqn 3.1})$$

The probit model is associated with the cumulative normal probability function. The general equation can be written

$$Z = a + b_1X_1 + b_2X_2 + \dots + b_nX_n \quad (\text{eqn 3.2})$$

The probit analysis solves the problem of how to obtain estimates for the parameters "a" and "b" while at the same time obtaining information about the underlying unmeasured scale index Z . The probit model assume that Z is a normally distributed random variable Z^* . (The probability of reenlist: $P(Y=1) = P(Z > Z^*)$, while the probability of not reenlist: $P(Y=0) = P(Z \leq Z^*)$.) Since the probability is measured by the area under the standard normal curve from $-\infty$ to Z , the event investigated will be more likely to occur the larger the value of the index Z .

The probit model will be used to analyze these unique dichotomous choices. First, the stay leave situation, and second, for those leaving, the choice of reserve participation.

Note that the slope of the Probit function is larger than that of the linear probability function in the middle range, but smaller at the extremes of the interval (-2,2). This is shown in Figure 3.1 below.

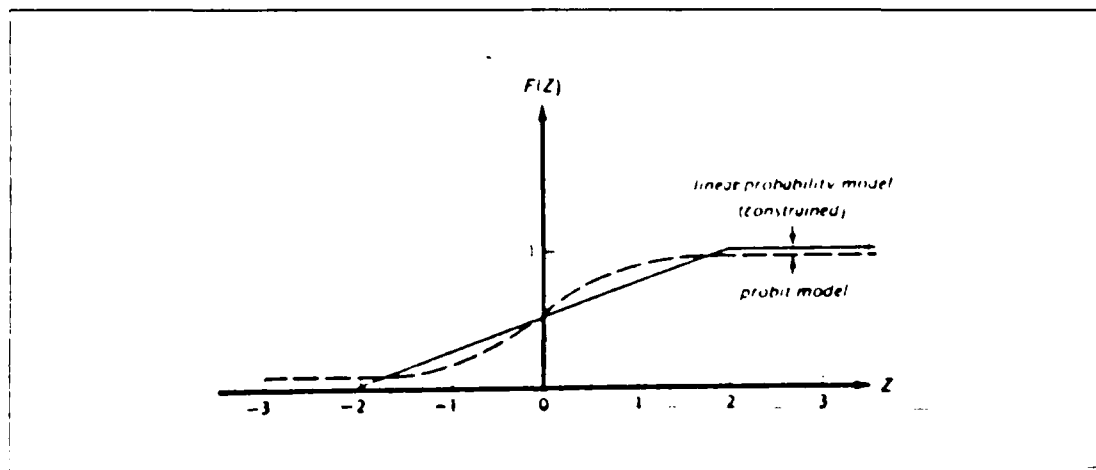


Figure 3.1 Probit Model.

Outside the (-2,2) interval the linear probability model has a slope of 0. The shape of the Probit function makes the values of the increments vary depending upon where on the scale they are measured.

IV. ANALYSIS OF REENLISTMENT INTENTIONS

A. VARIABLE REDUCTION

The number of candidate variables presented earlier in this chapter, are too many to give a reasonably handling of the model (40 variables). The final subset of independent variables needs to be small enough so that analysis is facilitated, yet large enough so that adequate description is possible. Even though one automatic selection procedure will be applied, the entire selection process must be viewed as pragmatic with large doses of subjective judgement. There are number of possible criteria for omitting candidate variables. As stated in [Ref. 18] an independent variable (1) may not be fundamental to the problem, (2) may be subject to large measurement errors, (3) may effectively duplicate another independent variable in the list, and or (4) may not yield any information on management policy alternatives to effect the behavior of interest and may limit the detection of the effect of policy variables with which it may have a strong relationship. There are also several other reasons for wishing to reduce the number of variables to be used in the final model. A model with large number of independent variables is expensive to estimate. Further, regression models with a limited number of independent variables are easier to analyze and understand. Finally, the presence of many highly intercorrelated independent variables may add little to the predictive power of the model. However, some very important variables will be maintained in the final model even if their explanatory power are low.

One of the methods described in [Ref. 18] is the "all-possible-regression selection procedure". This method involves an examination of all possible regression models involving the potential independent variables and identifying "good" subsets according to some criterion. Those criteria could be:

- * **R-square**
- * **MSE (error sum of squared)**
- * **C (total mean squared error)**

The intent is to find the point where adding more independent variables to the model is not worthwhile because it leads to a very small increase in the explanatory power.

Each of those methods imply a tremendous computing time since the number of all possible regression is calculated as 2 to the (P-1)-power, where P is the number of

independent variables. That makes the all-possible-regressions selection procedure not practical to use when the initial model contains more than 10 variables.

Another method could be to find the "best" subsets by use of an algorithm according to any of those criteria mentioned above. This method searches for the best possible regression models containing a specific number of variables according to the criterion used and uses much less computational effort than when all subsets are evaluated. Neter et al. [Ref. 18] do not recommend this method when the number of independent variables are as high as 40 (the number of candidate variables). For cases with large number of independent variables they state that the stepwise regression procedure is probably the most widely used and accepted of the automatic search methods. The stepwise regression method develops a sequence of regression models, at each step adding or deleting an independent variable. The criterion for adding or deleting an independent variable can be stated equivalently in terms of error sum of squares reduction, coefficient of partial correlation or F-statistic. The SPSSX software package uses the F-statistic as the criterion:

$$F = \frac{\text{Explained variance}}{\text{Unexplained variance}} \quad (\text{eqn 4.1})$$

The significance level used is .05 for entering a variable and .10 for deleting a variable. The tolerance specification is .01 which provides no variable to be added to the model which has a coefficient of multiple determination with the other variables already in the model which exceeds $1 - .01 = .99$.

B. MODEL ESTIMATION

A stepwise regression run for reenlistment intentions using all the candidate variables entered the following independent variables in steps 1 to 11:

- 1) satisfaction with military life (Q105)
- 2) fam better off with me in civ job (Q104D)
- 3) **years of service** (Q8)
- 4) **civ vs mil job** - chance of interesting work (Q102E)
- 5) **mil pay** benefits will not keep up with inflation (Q104C)
- 6) spouse work for pay (Q89)
- 7) feelings about current housing (Q59)
- 8) total amount of outstanding debts (Q94)
- 9) race (Q44)

10) gender (Q40)

11) civ vs mil job - chance of promotion (Q102G)

A limitation of the stepwise regression search approach is that it presumes there is a "best" subset of independent variables and seeks to identify it. The "best" subset is shown above. Nevertheless, previous studies have shown some explanatory effects of other candidate variables than those picked by the stepwise regression. Therefore, the following independent variables are added to those already picked:

- * marital status (Q46)
- * age at entry (Q42)
- * mil life as expected (Q104A)
- * branch of service (Army)
- * branch of service (Navy)
- * branch of service (MC)

The variables "spouse work for pay" (Q89) and "marital status" (Q46) are highly negatively correlated (-.892), so one of them was dropped. The variable Q89 was deleted because of the great number of cases in which the respondent did not have any spouse.

Multicollinearity was not observed between any of the other variables. All other bivariate correlation coefficients were below the .5 level. The probit analysis of the tentative model with sixteen variables showed the regression coefficients and significance level given in Table 5.

Although two of the variables in the tentative model, "my family is better off with me in a civilian job" (Q104D) and "satisfaction with military life" (Q105), were significant at the .01 level, the nature of those questions did not add very much to the understanding of the reenlistment decisions. Previous studies [Ref. 19] and [Ref. 20] have shown satisfaction with military life to be highly related to a set of other explanatory variables. Those variables were deleted from the final model.

The employment alternative variable "mil pay and benefits will not keep up with inflation" (Q104C) does not relate to alternative employment decisions and the impact of the inflation on civilian pay. The way the question is asked contributes little to the understanding of reenlistment decisions. This variable was also deleted from the final model.

TABLE 5
TENTATIVE REENLISTMENT MODEL

<i>Variable</i>	<i>Probit coeff</i>
Gender (Q40)	.062
Age at entry (Q42)	.022 *
Race (Q44)	.218 ***
Marital status (Q46)	.277 ***
Years of service (Q8)	.142 ***
Feeling curr housing (Q59)	-.057 ***
Mil life as expected (Q104A)	-.008
My family better off with me in civilian job (Q104D)	.526 ***
Satisfied with mil life (Q105)	.392 ***
Branch of service (Army)	.078
Branch of service (Navy)	-.195 **
Branch of service (MC)	-.099
Tot outstanding debts (Q94)	.097 ***
Civ vs mil job - chance for interesting work (Q102E)	.172 ***
Civ vs mil job - chance for promotion (Q102G)	.102 ***
Mil pay and benefits will not keep up with inflation (Q104C)	-.202 ***

*** = t significance level < .01

** = t significance level < .05

* = t significance level < .10

R-squared = .492

N = 3449

Pearson goodness-of-fit

chi square = 6495.491

Significant above the 99.5% level

d.f. 16

C. RESULTS OF REENLISTMENT DECISIONS

The results from the probit analysis of the final model can be viewed in Table 6. Accordingly, the probability of reenlist can be derived from the equation:

$$\begin{aligned} \text{Prob reenlist} = & -2.954 - .221Q40 + .014Q42 + .267Q44 & (\text{eqn 4.2}) \\ & + .209Q46 + .173Q8 + .001Q59 - .198Q104A \\ & + .067\text{Army} - .381\text{Navy} - .206\text{MC} + .075Q94 \\ & + .368Q102E + .259Q102G \end{aligned}$$

The number that this equation yields when entering values of the explanatory variables is a value of the cumulative probability for the normal random variable (the Z-value). To convert the Z-value to the probability of reenlist given the characteristics entered, the cumulative normal distribution table has to be used. For example, a Z-value of -1.0 gives the probability of .1587 (15.87%), while a Z-value of 0 gives .5 (50%). The more negative (smaller) the Z-value is, the smaller is the probability of reenlistment. The Z-value will almost always be between -3 (.001) and +3 (.998).

Table 6 indicates that the smallest predicted reenlistment probability will be .0001 for an individual with the following characteristics:

- * male
- * 17 years at entry
- * non-black
- * not married
- * 1 year of service
- * strongly disagree that military life was as expected
- * in the Army
- * no outstanding debts
- * expect a lot better chances for interesting work and promotion in civ job

Similarly, the largest predicted reenlistment probability will be .5263 for an individual **with** the following characteristics:

- * **female**
- * **30 years** at entry
- * black
- * married
- * 10 years of service
- * strongly agree that military life was as expected

TABLE 6
FINAL REENLISTMENT MODEL

<i>Variable</i>	<i>Probit coeff</i>
Gender (Q40)	-.221 ***
Age at entry (Q42)	.014
Race (Q44)	.267 ***
Marital status (Q46)	.209 ***
Years of service (Q8)	.173 ***
Feeling curr housing (Q59)	.001
Mil life as expected (Q104A)	-.198 ***
Branch of service (Army)	.067
Branch of service (Navy)	-.381 ***
Branch of service (MC)	-.206 ***
Tot outstanding debts (Q94)	.075 ***
Civ vs mil job - chance for interesting work (Q102E)	.368 ***
Civ vs mil job - chance for promotion (Q102G)	.259 ***

*** = t significance level < .01

** = t significance level < .05

* = t significance level < .10

R-squared = .276

N = 3483

Pearson goodness-of-fit

chi square = 3990.177

d.f. 13

Significant above the 99.5% level

- * in the Army
- * great outstanding debts
- * expect a lot worse chances for interesting work and promotion in civ job

In the following the results of the final model will be discussed in some detail. The variables are grouped as demographic, tenure, cognitive affective, economic, and employment alternative variables.

1. Demographic Variables

a. Gender

Males are less likely to reenlist than females. According to the probit analysis this variable has a regression coefficient of $-.221$ and is significant at the $.01$ level. At the midpoint value of each of the other variables the probability of reenlistment for females is $.26$, while for males the probability dropped to $.175$, a change of 32.7% . (Note that the percentage change will differ depending of what values are used for the other variables)

b. Age at entry

Entry age with a regression coefficient of $.014$ and a significant $t > .30$ has very little impact on reenlistment decision.

c. Race

Blacks are more likely to reenlist than non-blacks. The regression coefficient was $.267$ and is significant at the $.01$ level. At the midpoint value of each of the other variables the probability of reenlistment for non-blacks is $.26$, while for blacks it increased to $.328$ - an increase of 26.1% .

d. Marital status

Not surprisingly, married people are more likely to reenlist than singles. The regression coefficient was $.209$ and is significant at the $.01$ level. At the midpoint value of each of the other variables the probability of reenlistment of non-married is $.26$, while for married it increased to $.307$, an increase of 18.1% .

2. Tenure Variable

a. Years of service

This variable showed that the longer the individual had been in the services, the greater was the probability of reenlist. The regression coefficient was .173 with a .01 significance level. At the midpoint value of each of the other variables the probability of reenlistment of an individual with 3 years of service is .422. If the years of service increase to 4 the probability of reenlistment increases to .491, an increase of 16.3%.

3. Cognitive/Affective Variables

a. Feeling about current housing

This variable did not have any effect on the reenlistment decision.

b. Military life as expected

The variable showed significant difference in the reenlistment decisions whether the military life was as expected or not. The more the individual disagreed that the military life was as expected, the less was the likelihood of reenlistment. The regression coefficient was -.198 with a significant $t < .01$.

c. Branch of service

The probability of reenlist of an individual with given characteristics was greater in the Army and Air Force than in the Navy and Marine Corps; with the Navy enlistee carrying the least likelihood of reenlist (regression coefficient of -.381 with a significant $t < .01$). At the midpoint value of each of the other variables the probability of reenlistment of an individual in the Air Force (the reference branch of service) is .26. For an individual with the same characteristics, the probability of reenlistment in the Army, Navy, and Marine Corps are .257, .136, and .179, respectively.

4. Economic Variable

a. Amount outstanding debts

Outstanding debts was the only economic variable that showed a significant $t < .01$, but the effect on the reenlistment decisions was modest (regression coefficient of .075). At

the midpoint value of each of the other variables the probability of reenlistment of an individual with between \$2,000 and \$ 5,000 in outstanding debts is .340, while for an individual with outstanding debts of between \$5,000 and \$10,000 the probability of reenlistment increased to .370, an increase of 8.8%. (Not to misunderstand, this does not imply that the military should encourage enlisted people to take on more debts.)

5. Employment Alternative Variables

a. Civ vs mil job - chances for interesting work

The less favorable the individual viewed the possibilities of more interesting work in a civilian job than in a military job, the more likely would the individual reenlist. The regression coefficient was .368 and is significant at the .01 level.

b. Civ vs mil job - chances for promotion

A less favorable view of the possibilities of promotion in a civilian job compared to a military job yields a higher probability of reenlistment. The regression coefficient was .259 with a significant $t < .01$.

6. Validation of the Reenlistment Model

To see how valid the predictions made by this model were, a Probit model was estimated for a restricted number of cases using the same variables as the final reenlistment model. In the restricted model only the first 2500 cases (72% of 3483 - the total number of cases) were used. This model was then used to forecast the reenlistment intentions for the remainder of the sample.

The predicted probabilities of reenlistment for the last 983 cases (3483-2500) were computed using the probit coefficients developed for the restricted model. The mean predicted probability for the restricted model was computed to be .1966. The predicted **probability** mean value was used as the cut-off point for reenlistment intent. Cases for **which** the predicted probability value was greater than or equal to .1966 were predicted **to reenlist**. Individuals having predicted probability values less than .1966 were predicted not to reenlist. The predicted reenlistment intentions were compared to actual reenlistment for each of the 983 cases. The comparisons are shown in Table 7.

TABLE 7
ACTUAL VS PREDICTED REENLISTMENTS

		<i>Predicted reenlistment</i>	
		NO	YES
Actual	NO	569 (72.5%)	216 (27.5%)
	YES	45 (22.7%)	153 (77.3%)

The model was consistent in its ability to correctly predict which individual would reenlist (77.3% correct) and which individual would not reenlist (72.5% correct). Altogether, the model seems to predict right in 722 (569 + 153) out of 983 cases - or 73.4% right.

V. ANALYSIS OF RESERVE INTENTIONS

A. VARIABLE REDUCTION

As with reenlistment intentions the number of candidate variables (40 variables) are too many to give a reasonably handling of the reserve intention model. The same reasoning and methodology for reducing the number of candidate variables for the reenlistment model will be used for the reserve model.

B. MODEL ESTIMATION

The stepwise regression procedure for reenlistment intentions using all forty candidate variables yielded the following thirteen independent variables:

- 1) satisfaction with military life (Q105)
- 2) race (Q44)
- 3) civ vs mil job - having a say (Q102B)
- 4) civ vs mil job - retirement benefits (Q102C)
- 5) total income (TOTINC)
- 6) gender (Q40)
- 7) branch of service - Navy
- 8) branch of service - Army
- 9) branch of service - MC
- 10) spouse work for pay (Q89)
- 11) civ vs mil job - immediate supervisors (Q102A)
- 12) fam better off with me in civ job (Q104D)
- 13) mil pay benefits will not keep up with inflation (Q104C)

Previous studies have shown some explanatory effects of other candidate variables than those picked by the stepwise regression. Therefore, the following independent variables were added to those already picked:

- * marital status (Q46)
- * age at entry (Q42)
- * mil life as expected (Q104A)
- * years of service (Q8)

The variables "spouse work for pay" (Q89) and "marital status" (Q46) are highly negatively correlated (-.898), so one of them was dropped. The variable Q89 was

deleted because of the great number of cases in which the respondent did not have any spouse.

Multicollinearity was not observed between any others of the variables. All other correlation coefficients were below the .5 level. The probit analysis of the tentative model with sixteen variables showed the regression coefficients and significance level given in Table 8.

Although the variable "Satisfied with military life" (Q105) was highly significant, the nature of the question did not add much to the understanding of the reserve decisions. Previous studies [Ref. 19] and [Ref. 20] have shown satisfaction with military life to be related to a set of the other explanatory variables. The variable was deleted from the final reserve model.

C. RESULTS OF RESERVE INTENTIONS

The results from the probit analysis of the final model can be viewed in Table 9.

Accordingly, the probability of joining the reserves can be derived from this equation:

$$\begin{aligned} \text{Prob reserves} = & -2.070 + .277Q40 + .027Q42 + .314Q44 & (\text{eqn 5.1}) \\ & + .111Q46 + .013Q8 + .081Q104A + .162Q104D \\ & + .014TOTINC + .468\text{Army} + .367\text{Navy} + .380\text{MC} \\ & + .138Q102A + .144Q102B + .068Q102C + .077Q104C \end{aligned}$$

In the following the results of the final model will be discussed in some detail, grouped in demographic, tenure, cognitive affective, economic, and employment alternative variables.

1. Demographic Variables

a. Gender

Males are **less likely** to join the reserves than females. According to the probit analysis this variable **has a regression coefficient of** -.277 and is significant at the .01 level. At the midpoint of each of the other variables the probability of an individual of joining the reserves is for females .268, while for males the probability of joining the reserves is .184, a decrease of 31.3%.

TABLE 8
TENTATIVE RESERVE MODEL

<i>Variable</i>	<i>Probit coeff</i>
Gender (Q40)	-.225 ***
Age at entry (Q42)	.024 **
Race (Q44)	.392 ***
Marital status (Q46)	.099 *
Years of service (Q8)	.006
Total income (TOTINC)	.011 **
Mil life as expected (Q104A)	-.010
My family better off with me in civilian job (Q104D)	.082 **
Satisfied with mil life (Q105)	.191 ***
Branch of service (Army)	.452 ***
Branch of service (Navy)	.406 ***
Branch of service (MC)	.386 ***
civ vs mil job - immediate supervisors (Q102A)	.096 ***
Civ vs mil job - having a say (Q102B)	.100 ***
Civ vs mil job - retirement benefits (Q102C)	.075 ***
Mil pay and benefits will not keep up with inflation (Q104C)	-.091 ***
*** = t significance level < .01	
** = t significance level < .05	
* = t significance level < .10	
R square = .108	N = 2698
Pearson goodness-of-fit chi square = 2605.174	d.f. = 16
Significance above the 99.5% level	

TABLE 9
FINAL RESERVE MODEL

<i>Variable</i>	<i>Probit coeff</i>
Gender (Q40)	-.277 ***
Age at entry (Q42)	.028 *
Race (Q44)	.364 ***
Marital status (Q46)	.111 *
Years of service (Q8)	.013
Total income (TOTINC)	.014 **
Mil life as expected (Q104A)	-.081 ***
My family better off with me in civilian job (Q104D)	.162 ***
Branch of service (Army)	.468 ***
Branch of service (Navy)	.367 ***
Branch of service (MC)	.380 ***
civ vs mil job - immediate supervisors (Q102A)	.138 ***
Civ vs mil job - having a say (Q102B)	.144 ***
Civ vs mil job - retirement benefits (Q102C)	.068 ***
Mil pay and benefits will not keep up with inflation (Q104C)	-.077 ***
*** = t significance level < .01	
** = t significance level < .05	
* = t significance level < .10	
R square = .092	N = 2725
Pearson goodness-of-fit chi square = 2727.949	d.f. = 15
Significance above the 99.5% level	

b. Age at entry

This variable showed to have very little impact on reserve decisions with a regression coefficient of .028 and a significant $t < .01$.

c. Race

Blacks are more likely to join the reserves than non-blacks. The regression coefficient was .364 with a significant $t < .01$. At the midpoint of each of the other variables the probability of an individual of joining the reserves is for non-blacks .268 ,while for blacks the probability of joining the reserves is .40, an increase of 40%.

d. Marital status

Married people are slightly more likely to join the reserves than singles. The regression coefficient was .111 but the significance level was only $t < .01$.

2. Tenure Variable

a. Years of service

This variable had very little effect on the reserve decisions. The regression coefficient was .013 with a significant $t = .40$.

3. Cognitive/Affective Variables

a. Military life as expected

The more the individual disagree that the the military life was as expected, the less are the probability that that individual will join the reserves.

b. My family better off with me in a civilian job

The more ~~the~~ the individual disagree that the family is better off with the individual in a civilian ~~job~~, ~~the~~ higher is the probability that the individual will join the reserves.

c. Branch of service

The probability of joining the reserves of an individual with given characteristics was greatest in the Army closely followed by the Marine Corps and Navy. Regression

coefficients of .468, .380, and .367, respectively, and are significant at the .01 level. The reference variable - Air Force - had the individual with the lowest probability of joining the reserves. At the midpoint of each of the other variables the probability that an individual will join the reserves in the Air Force is .139, while the probabilities of joining the reserves in the Army, Marine Corps, and Navy are .268, .245, and .235, respectively.

4. Economic Variable

a. Total income

Total income was the only economic variable that showed any significance; the effect on the reserve decisions was modest (regression coefficient of .014, .05 > = significance of $t > .01$).

5. Employment Alternative Variables

a. Civ vs mil job - immediate supervisors

The less favorable the individual viewed the immediate supervisors in a civilian job than in a military job, the more likely would the individual join the reserves. The regression coefficient was .138 with a significant $t < .01$.

b. Civ vs mil job - having a say

Like the last preceding variable, a less favorable view of the possibilities of having a say in a civilian job compared to a military job yield a higher probability of joining the reserves. The regression coefficient was .144 with a significant $t < .01$.

c. Civ vs mil job - retirement benefits

The better the individual views the military retirement benefits compared to the civilian retirement benefits, the more likely are the individual to join the reserves. The regression coefficient was .068 with a significant $t < .01$.

d. Military pay/benefits will not keep up with inflation

The more an individual disagrees that military pay benefits will keep up with inflation, the more likely will the individual join the reserves. (He/she has already decided not to reenlist) The regression coefficient was -.077 with a significant $t < .01$.

6. Validation of the Reserve Model

To see how valid the predictions made by this model were, a Probit model was estimated for a restricted number of cases using the same variables as the final reserve model. In the restricted model only the first 1900 cases (70% of 2725 - the total number of cases) were used. This model was then used to forecast the reserve intentions for the remainder of the sample.

The predicted probabilities of joining the reserves for the last 825 cases (2725-1900) were computed using the probit coefficients developed for the restricted model. The mean predicted probability for the restricted model was computed to be .2698. The predicted probability mean value was used as the cut-off point for reserve intent. Cases for which the predicted probability value was greater than or equal to .2698 were predicted to join the reserves. Individuals having predicted probability values less than .2698 were predicted not to join the reserves. The predicted reserve intentions were compared to "actual" reserves for each of the 825 cases. The comparisons are shown in Table 10 below:

TABLE 10
ACTUAL VS PREDICTED RESERVES

		<i>Predicted "reservists"</i>	
		NO	YES
Actual	NO	364	235
		(60.8%)	(38.2%)
"reservists"	YES	83	143
		(36.7%)	(63.3%)

The model was consistent in its ability to correctly predict which individual would join the reserves (63.3% correct) and which individual would not join the reserves (60.8% correct). Altogether, the model seems to predict right in 507 (364 + 143) out of 825 cases - or 61.5% right.

VI. CONCLUSIONS AND RECOMMENDATIONS

1. General

The R-squares for the final reenlistment model and final reserve model were .276 and .092, respectively, which could imply that the conclusions derived from the reenlistment model have a stronger empirical basis than those derived from the reserve model. Because of the fact that the two models are not using the same dependent variable, the R-squares cannot be directly compared. However, analysis of the predictability of each model showed that the reenlistment model has a higher correct prediction rate than the reserve model (75.5% and 62.8%, respectively).

The candidate variables used in creating the reenlistment model are the same as those used in creating the reserve model. Therefore, the comparison of the factors that affected the reenlistment decisions and the factors that affected the reserve decisions is done in two sequences:

- 1) Those variables that had explanatory effect on both decisions.
- 2) Those variables that only had explanatory effect on one of the decisions.

"Stayers" and "reservists" proved to have the following variables in common in explaining their decision whether to reenlist or not and - when decided to leave the armed forces - whether to join the reserves or not:

- * gender
- * age at entry
- * race
- * marital status
- * years of service
- * military life as expected
- * **branch of service**

The following of the candidate variables showed only to have effects in explaining **the reenlistment decision**

- * feeling about current housing
- * amount of outstanding debts
- * civ vs mil job - chances for interesting work
- * civ vs mil job - chances for promotion.

while the candidate variables

- * total income
- * my family better off with me in a civilian job
- * civ vs mil job - immediate supervisors
- * civ vs mil job - having a say
- * civ vs mil job - retirement benefits
- * mil pay and benefits will not keep up with inflation

showed only to have explanatory effects on the reserve decisions.

2. Effect of Common Variables

a. Gender

This variable has significant effect on both affiliation decisions (significant $t < .01$), the direction was the same, and the magnitude almost identical. The regression coefficients for reenlistment decision and reserve decision were $-.221$ and $-.277$, respectively. The conclusion is that whether the decision is to reenlist or - if decided to leave after all - to join the reserves, the females have higher affiliation potentials than males. This implies that the policy makers should consider recruiting more females to the armed forces in the future, then both the reenlistment rate and the reserve participation rate should increase. Note that performance efficiency or legal constraints have not been investigated.

b. Age at entry

It seems that within the age range represented in this sample, the age of an enlisted person when entered the military services does not affect the subsequent decisions of reenlistment and or joining the reserves.

c. Race

For both affiliation decisions this study shows that blacks are stronger affiliated with the military than non-blacks (significant at the .01 level). The effect of this variable is larger in the reserve decision than in the reenlistment decision.

d. Marital status

This study shows that - at .01 significance level - that a married enlisted are more likely to reenlist than a single enlisted. The same result was indicated for the reserve decision, but the significance was weaker (significant $t < .10$).

e. Years of service

This variable shows only significant impact on the reenlistment decision, which means that if more enlisted completed longer term contracts, the the reenlistment rate for first and second termers would increase. When individuals finally leave the active duty, for first termers and second termers the number of years spent of active duty left behind does not influence the reserve decision.

f. Military life as expected

The degree of met expectations of military life shows significant impact on both the reenlistment and reserve decisions. The effect, though, is greatest for the reenlistment decision. The conclusion to be drawn from this finding is that all the different recruitment efforts - advertising, orientations etc. - should stress to make a correct an relevant picture of military life, and in return get individuals stronger affiliated with the military.

g. Branch of service

These variables were used to show the differences between each of the four services, Army, Navy, Marine Corps, and Air Force. In the reenlistment decision the ranking of the services according to where the enlisted are most likely to reenlist is:

- 1) Army
- 2) Air Force
- 3) Marine Corps
- 4) Navy

The magnitude of the differences is substantial; the probability of an individual to reenlist in the Army is about 50% higher than in the Navy, 33% higher than in the Marine Corps, and 2% higher than in the Air Force.

In the reserve decision the ranking of the services according to where the enlisted ~~personnel~~ are most likely to join the reserves changes in the ranking of the Air Force. The ranking is:

- 1) Army
- 2) Marine Corps
- 3) Navy
- 4) Air Force

The magnitude of the differences shows that the probability of an individual of joining the reserves in the Army is about 50% higher than in the Air Force, and 12% and 9% higher than in the Navy and Marine Corps, respectively. Air Force enlisted personnel seems to have much stronger active duty affiliation intentions than they do reserve affiliation intentions relative to the other service branches.

3. Effect of Reenlistment Model Specific Variables

a. Amount of outstanding debts

This variable has significant effect on the reenlistment decision; the greater the enlisted's outstanding debts is, the greater is the likelihood of reenlistment. Enlisted personnel seem to view military employment as secure employment - more secure than a civilian employment alternative offered. (A bit surprising that this variable did not have any effect on the reserve decision showing the need for moonlighting).

b. Civilian vs military job - chances of interesting work

The individual's view of chances for interesting work in a civilian job compared to a military job has significant impact on its reenlistment decision. In fact this variable has the single greatest effect on the reenlistment decision. This implies that job content meaningful work for the individual should be strongly emphasized by the military employer commanding officer in order to increase retention.

c. Civilian vs military job - chances for promotion

Like the preceding variable, chances for promotion has significant impact on alternative employment decisions. Although the overall effect on the reenlistment decision is not as great as for the latter variable, it shows that an individual has to have reasonable promotion opportunities if willing to retain within the military. When the military experiences low retention unsatisfactory promotion opportunities may likely be one of the reasons for it.

4. Effects of Reserve Model Specific Variables

a. Total income

The higher the total income as an enlistee an individual have the higher is the probability of that individual to join the reserves. More pay may indicate higher rank.

longer tenure, a faster promotion pace, or more special pay. This variable needs more examination to detect what combinations of effects are present. (Surprisingly, this variable does not affect the reenlistment decision).

b. My family better off with me in a civilian job

Considering that those individuals investigated for their reserve intentions are those who will not reenlist, this variable shows quite a paradox. Those individuals that are most likely to join the reserves are those that strongly disagree to the postulate that the family is better off with the enlisted person in a civilian job. There should be more likely to find that this variable either has no significant effect (the family with respect to this question was unrelated to the reserve intentions) or a negative significant coefficient (those who strongly agreed to that postulate were most likely to join the reserves). (This variable was deleted from the reenlistment model).

c. Civ vs mil job - im. supervisors, having a say, retirement benefits

All these three variables showed that the more favorable the individual viewed those three areas in the military compared to within civilian job, the more likely the individual would join the reserves. This indicates that for individuals who choose not to continue active duty (despite the fact that these variables were not important in the reenlistment decision) it may pay off in the long run if the military can improve those areas and thereby increase the reserve potential.

d. Military pay and benefits will keep up with inflation

This variable is not within control of the military personnel policy makers, but shows how inflation - or the expectation of it - have some impact on the reserve decision. (For the reenlistment decision this variable was deleted.)

5. Recommendations

Based on the findings described in detail above, the military policy makers and commanders **should be aware** of the following when trying to increase the number of people they want to keep affiliated with the armed forces - either in active duty or as reserves.

An increase in the number of females in the services will also increase the reenlistment rate and reserve participation. An increase in the number of blacks enlisted will likely increase the reenlistment rate and reserve participation.

An increase in the proportion of married enlisted personnel will increase the reenlistment rate and reserve participation. Even though married people are more expensive in housing expenses and special allowances than single people, this additional expense may be offset by those gains yielded from saved training and recruitment expenses.

When recruiting enlisted personnel the true characteristics of military life should be stressed, so the enlisted experiences a great similarity between military life as told and as experienced.

Two specific areas of the work life were indicated as very important in the reenlistment decision: "chances for interesting work" and "chances for promotion". Special attention should be placed on those areas in the future to secure satisfaction and reenlistment of personnel. Likewise, areas of work life like "relations to immediate supervisors", "the feeling of having a say", and "the retirement benefits" were shown to be of major importance for those who plan to join the reserves.

6. Future Investigations/Research

Even if the R-squares obtained for the reenlistment model in this study are relatively good when considered the kind of data used in the analysis, they indicate that there is still much more to investigate to fully understand the turnover problem within the armed forces. In the following some future research are suggested.

The data base used for this study (the newest one available) was of some age. Any conclusions could therefore be refused by claiming that the situation has changed since the survey used took place. Therefore, some efforts should be made to obtain up to date information and have a similarly study taken place using those data. The results should be compared to see what changes had occurred and to find any trends of any importance. A new 1985 survey should be available later this year for such comparisons and updating purposes.

As stressed previously turnover has both positive and negative consequences. There are costs of keeping people and there are costs involved when replacing people that quit. All losses are not of equal quality. Research should be undertaken with a focus on the quality of personnel and factors affecting their reenlistment decisions.

An additional area of future research is the applications of a trinomial logit analysis to the single discrete choice problem with the choices: (1) stay in active duty, (2) leave active duty and join the reserves, and (3) leave the active duty and do not join

the reserves. This modeling effort should be undertaken and the results compared with the insights offered in this thesis.

APPENDIX A **FREQUENCIES OF DEPENDENT VARIABLE**

Q17

Plans for Joining National Guard or Reserves

<i>Value Label</i>	<i>Value</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cum Percent</i>
Definitely yes	1	350	7.9	7.9	7.9
Probably yes	2	752	17.0	17.0	24.9
Probably no	3	975	22.0	22.0	46.9
Definitely no	4	1333	30.1	30.1	76.9
Dont know	5	1024	23.1	23.1	100.0
		-----	-----	-----	
	Total	4434	100.0	100.0	100.0

Q20

Likely to Reenlist - No Bonus Paid

<i>Value Label</i>	<i>Value</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cum Percent</i>
No chance	0	2348	53.0	53.0	53.0
Very slight possibility	1	493	11.1	11.1	64.1
Slight possibility	2	156	3.5	3.5	67.6
Some possibility	3	179	4.0	4.0	71.6
Fair possibility	4	116	2.6	2.6	74.2
Fairly good possibility	5	123	2.8	2.8	77.0

Good possibility	6	126	2.8	2.8	79.9
Probable	7	109	2.5	2.5	82.3
Very probable	8	91	2.1	2.1	84.4
Almost sure	9	183	4.2	4.1	88.5
Certain	10	510	11.5	11.5	100.0
		-----	-----	-----	
	Total	4434	100.0	100.0	100.0

APPENDIX B

CANDIDATE VARIABLES

- Q3 In what service are you now serving?
- Q7 How do you feel about your current location?
- Q8 To the nearest year and month, how long have you been on active duty? (If you had a break in service, count current time and time in previous tours.)
- Q40 Are you male or female?
- Q42 When you first entered active service, how old were you?
- Q44 What do you consider to be your main racial or ethnic group?
- Q46 What are your marital status now?
- Q57 How many people, including your spouse, are living with you now at your current location?
- Q59 How do you feel about your current housing?
- Q89 In 1978, how many weeks did your spouse work for pay, either full or part-time, at a civilian job, not counting work around the house? Include weeks that your spouse was on paid vacation and paid sick leave.
- Q94 As of today, what is your estimate of total amount of outstanding debts that you may have? Exclude any mortgage.
- Q95 What would you say is the total value of any savings accounts, checking accounts or cash, U.S. Savings Bonds, stocks or securities that you might have right now?
- Q96 **Compared** to three years ago how is your financial situation?
- Q97 **In the past** 12 months, did you receive any job offers for a civilian job which you could take if you leave the service?
- Q98 If you were to leave the service now and try to find a civilian job, how likely would you be to find a good civilian job?
- Q100 Suppose you were to leave the service now and try to find a civilian job. How likely would you be to find a civilian job that uses the skills in your military career field?

- Q102 If you were to leave the service now and take a civilian job, how do you think that job would compare with your present military job in regard to the following work conditions?
- A The immediate supervisors
 - B Having a say in what happens to me
 - C The retirement benefits
 - D The medical benefits
 - E The chances for interesting and challenging work
 - F The wages or salaries
 - G The chances for promotion
 - H The opportunities for training
 - I The people I work with
 - J The work schedule and hours of work
 - K The job security
 - L The equipment I would use on the job
 - M The location of the job
- Q103 Suppose you left the service now. How do you think the total military compensation you are receiving now (pay and benefits) would compare with the total compensation (pay and benefits) you would receive in a civilian job?
- Q104 How much do you agree or disagree with each of the following statements about military life?
- A Life in the military is about what I expected it to be
 - C My military pay and benefits will not keep up with inflation
 - D My family would be better off if I took a civilian job
- Q105 Now, taking all things together, how satisfied or dissatisfied are you with the military as a way of life?

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